



IN REPLY REFER TO:

# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

1011 E. Tudor Road  
Anchorage, Alaska 99503-6199



AFES/MMM

JUL 10 2008

Ms. Susan Childs  
Shell Exploration & Production Company  
3601 C Street, Suite 1334  
Anchorage, Alaska 99503

Dear Ms. Childs:

This responds to your November 20, 2007, request for Letters of Authorization (LOA) for the incidental and intentional take of polar bears in relation to the Shell Offshore, Inc. (Shell) 2008 Beaufort Sea Open-water Exploration Program.

Enclosed is a LOA (08-13) that would allow Shell to take small numbers of polar bears and Pacific walrus incidental to oil and gas industry exploration activities identified in your LOA request. Shell, in partnership with geophysical contractors, will be conducting a three-dimensional seismic survey, site clearance, shallow hazard, and onshore baseline surveys in the Beaufort Sea. The proposed start date for this project is mid July 2008.

If any changes develop in your project during the 2008 open-water season, such as flight paths, activities or location, the Marine Mammals Management Office (MMM) must be notified prior to the planned operation. This will allow us to evaluate the activity and, if appropriate, amend the LOA.

This letter, through a separate authorization, also grants Shell authority to take polar bears by harassment (deterrence activities) for the protection of both human life and polar bears while conducting activities in polar bear habitat. This authorization allows only the harassment or deterrence of polar bears and does not authorize lethal take of a polar bear. This authorization is issued specifically to Shell employees who are responsible for ensuring that trained and qualified personnel are assigned the task to harass (deter) polar bears. All polar bear harassment events are to be reported to our MMM within 24 hours. Observation forms can be sent by fax or electronic mail to our office. This authorization is effective from the date of issuance to November 30, 2008. Intentional take is authorized under sections 101(a)(4)(A), 109(h), and 112(c) of the Marine Mammal Protection Act (MMPA). A final report of all encounters and hazing events is due 60 days from the expiration of this authorization (by January 31, 2009).

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In addition to protection measures for marine mammals described in the Shell polar bear interaction plan (Polar Bear and Pacific Walrus Awareness and Interaction Plan, North Slope and Chukchi Sea, Alaska, April 2008), the U.S. Fish and Wildlife Service (Service) believes that Shell personnel can limit human/polar bear interactions by being observant of approaching animals, such as through the use of marine mammal observers, and breaking off interactions, if practicable, thereby allowing the animals to continue their travel. Service biologists are available for consultation if questions or concerns arise regarding polar bears during the project period at the phone numbers listed below and noted in your interaction plan.

Any situations where the application of deterrents involves a safety risk to personnel should be avoided. If a polar bear interaction escalates into a life threatening situation, Section 101(c) of the MMPA allows, without specific authorization, the take (including lethal take) of a polar bear if such taking is imminently necessary in self-defense or to save the life of a person in immediate danger, and such taking is reported to the MMM within 24 hours.

Furthermore, in accordance with Section 7 of the Endangered Species Act of 1973, as amended (ESA), issuance of this LOA also fulfills the requirements for Tier 2 Consultation of the Programmatic Biological Opinion for the activities described herein. In the "Programmatic Biological Opinion for Polar Bears (*Ursus maritimus*) on Beaufort Sea Incidental Take Regulations" (June 2008; Tier 1 BO), the Service determined that the take anticipated as a result of the issuance of the Incidental Take Regulations is not likely to result in jeopardy to the polar bear, in accordance with Section 7 of the ESA. In order for the Tier 2 BO to be consistent with the "no jeopardy" conclusion of the Tier 1 BO and for an ESA incidental take statement (ITS) to be issued, the following need to occur: (1) the proposed activity must provide the required information, as described in the §18.124 of the Incidental Take Regulations, (2) the LOA includes any mitigation measures that the MMM believes appropriate for the specific activity and location, as described in §18.128 of the Incidental Take Regulations, and (3) the MMM must determine that the incidental take for the specific activity will be consistent with the negligible impact finding for the total take allowed under the Incidental Take Regulations.


A reasonable and prudent measure and implementing terms and conditions were included for the MMM in the Tier 1 BO and have been incorporated into the LOA process. Issuance of this ITS with the LOA completes ESA requirements for authorization of incidental take of the polar bear. Compliance with the terms and conditions of this LOA ensures that the LOA holder is also in compliance with the ESA.

Ms. Susan Childs

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This authorization is issued in accordance with our regulations listed at 71 FR 43926, dated August 2, 2006. Should you have any further questions contact Mr. Craig Perham of our Marine Mammals Management Office at (907) 786-3800 or 786-3810.

Sincerely,

  
Acting Regional Director

Enclosure

cc: Mr. Rance Wall, MMS  
Fairbanks Fish and Wildlife Field Office (FWFO)  
USFWS Office of Law Enforcement (OLE)





IN REPLY REFER TO:

## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

1011 E. Tudor Road  
Anchorage, Alaska 99503-6199



MMM

ISSUED: July 7, 2008  
EXPIRES: November 30, 2008

### LETTER OF AUTHORIZATION (08-13)

Shell Offshore, Inc. (Shell) is hereby authorized to take small numbers of polar bears and Pacific walrus incidental to activities occurring during the 2008 Beaufort Sea Open-water Exploration Program. Shell, in partnership with geophysical contractors, will be conducting site clearance, shallow hazard surveys, and a 3D seismic program in the Beaufort Sea. A detailed description of the authorized activities can be found in the "Request for Letter(s) of Authorization for the Incidental Take of Polar Bears and Pacific Walrus and intentional Take of Polar bears for Various Open Water Activities in the Beaufort Sea, 2008," dated November 30, 2007.

The LOA is valid from the date of issuance to November 30, 2008. This authorization and the required conditions below include contractors of Shell performing Shell-approved work under the scope of operations to be conducted. The 2008 Shell Beaufort Sea Open water Program Activity has multiple components:

1. a deep 3D marine seismic survey;
2. a site clearance and shallow hazard surveys;
3. an ice gouge survey;
4. a strudel scour survey;
5. an aerial marine mammal surveys;
6. a geotechnical boring program; and
7. an onshore baseline survey

This authorization is subject to the following conditions:

1. The Operations Manager will be fully aware, understand and capable of implementing the conditions of this authorization.
2. This Authorization is valid only for activities (including support vessels and aircraft) associated with Shell's 2008 Beaufort Sea Open-water Activities Program, as specified in Shell's

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November 20, 2007 application. Changes in the siting, timing, scope or nature of project activities will require prior review and approval.

3. The following documents are hereby approved, and all provisions unless specifically noted are incorporated into this authorization by reference:

(a) *Marine Mammal Monitoring and Mitigation Plan for Seismic Exploration in the Alaskan Chukchi and Beaufort Seas, 2008*, October 2007. Received by the Service April 16, 2008.

(b) *Polar Bear Interaction Plan* (Polar Bear and Pacific Walrus Awareness and Interaction Plan, North Slope and Chukchi Sea, Alaska, April 2008).

4. The species authorized for takings, by Level B Harassment only, are: Pacific walrus (*Odobenus rosmarus divergens*), and polar bear (*Ursus maritimus*). The taking of any walrus or polar bear in a manner prohibited under this authorization must be reported within 24 hours of the taking to the U.S. Fish and Wildlife Service (Service) Incidental Take Coordinator in Anchorage Alaska (907-786-3800), or their designee, as specified in condition 10(d).

5. The holder of this Authorization is required to cooperate with the Service and any other Federal, state or local agency monitoring the impacts of the activity on walruses and polar bears. The holder must notify the Service Incidental Take Coordinator at least 24 hours prior to the start of collecting seismic data.

6. At the discretion of the Service, the operator will allow the Service to place an observer on site (vessels and aircraft) to monitor the impacts of the activity on Pacific walruses and polar bears.

7. Prohibitions:

(a) The taking, by incidental Level B harassment only, is limited to the species listed under condition 4 above. The taking by Level A harassment, serious injury, or death of these species is prohibited and may result in the modification, suspension or revocation of this Authorization.

(b) The taking of any walrus or polar bear whenever the required marine mammal mitigation and monitoring measures (conditions 8 and 9) have not been fully implemented as required by this Authorization, is prohibited.

8. Polar bear and walrus monitoring and mitigation must be conducted in accordance with 50 CFR Section 18.128, where Shell must comply with the following monitoring, mitigation, and reporting requirements:

(a) *General Mitigation:*

The holder of this Authorization is required to:

(i) (A) Avoid concentrations or groups of walruses and polar bears hauled out onto

land or ice by all vessels and aircraft under the direction of Shell. Operators of support vessels and aircraft should, at all times, conduct their activities at the maximum distance possible from known or observed concentrations of animals. Under no circumstances, other than an emergency, should vessels operate within ½ mile (805 meters) of walrus or polar bears observed on land or ice. Under no circumstances, other than an emergency, should aircraft operate at an altitude lower than 1,000 feet (305 meters) when within ½ mile of any walrus or polar bear observed on land or ice; and,

(B) When weather conditions do not allow a 1,000-foot flying altitude, such as during severe storms or when cloud cover is low, aircraft may be operated below the 1,000-foot altitude stipulated above. However, when aircraft are operated at altitudes below 1,000 feet because of weather conditions, the operator must avoid known walrus and polar bear concentration areas and should take precautions to avoid flying directly over or within ½ mile of known walrus and polar bear concentration areas.

(ii) Take every precaution to avoid harassment of walrus or polar bears in water when a vessel is operated near these animals. Vessels must reduce speed when within 300 yards (274 meters) of walrus or polar bears observed in water and vessels capable of steering around these animals must do so. Vessels may not be operated in such a way as to separate members of a group of walrus or polar bears from other members of the group. Vessels should avoid multiple changes in direction and speed when within 300 yards of walrus or polar bears.

(iii) Operate in full compliance with the terms identified in the approved documents identified in Condition 3.

*(b) Seismic Vessel Mitigation:*

The holder of this Authorization is required to:

(i) Reduce the volume of the airgun array during vessel turns while running seismic lines.

(ii) To the extent practical, whenever a marine mammal is detected outside the exclusion zone radius, and based on its position and motion relative to the ship track is likely to enter the safety radius, an alternative ship speed or track will be calculated and implemented.

(iii) Exclusion and Monitoring-Safety Zones:

(A) Establish and monitor with trained observers a preliminary exclusion zone for walrus surrounding the seismic airgun array where the received level would be 180 dB.

(B) Establish and monitor with trained observers a preliminary exclusion zone for polar bear surrounding the seismic airgun array where the received level would be 190 dB.

(C) As soon as possible, arrange for the direct field measurements of received levels of underwater sound versus distance and direction from the airgun arrays using calibrated hydrophones. Immediately upon completion of data analysis of the field verification measurements establish and monitor new 180-dB and 190-dB marine mammal exclusion zones.

(iv) Power-down/Shut-down:

(A) Immediately shut-down or power-down the seismic airgun array and/or other acoustic sources, whenever any walrus are sighted approaching close to or within the area delineated by the 180 dB isopleth, or polar bear are sighted approaching close to or



within the area delineated by the 190 dB isopleth established under condition 8(b)(iii).

(B) Not proceed with ramping up the seismic airgun array unless the safety zones described in condition 8(b)(iii) are visible and no walruses and polar bears are detected within the appropriate safety zones; or until 30 minutes after there has been no further visual detection of the animal(s) within the safety zone and the trained marine mammal observer on duty is confident that no walruses and polar bears remain within the appropriate safety zone.

(C) Emergency shut-down. If observations are made or credible reports are received that one or more walruses and polar bears are within the area of the seismic survey are in an injured or mortal state, or are indicating acute distress due to seismic noise, the seismic airgun array will be immediately shut down and the Service Incidental Take Coordinator contacted. The airgun array will not be restarted until review and approval has been given by either the Service Incidental Take Coordinator or their designee.

(v) Ramp-up:

(A) Prior to commencing ramp-up described in condition 8 (b)(v)(C), conduct a 30-minute period of marine mammal observations by at least one trained marine mammal observer at the commencement of seismic operations and at any time electrical power to the airgun array is discontinued for a period of 10 minutes or more and the marine mammal observer watch has been suspended;

(B) If the safety radii are not completely visible for at least 30 minutes prior to ramp-up in either daylight or nighttime, do not commence ramp up unless the seismic source has maintained a sound pressure level of at least 180 dB during the interruption of seismic survey operations.

(C) If the complete 180 dB safety range is visible and no walruses and polar bears are observed while undertaking pre-ramp-up monitoring under conditions 8(b)(v)(A) and (B), ramp-up airgun arrays slowly over a period of at least 20 minutes starting with the smallest airgun in the array and then adding additional guns in sequence, until the full array is firing: (1) At the commencement of seismic operations, and (2), anytime after the airgun array has been powered down for more than 10 minutes.

(D) Do not proceed with ramp-up whenever the entire 180 dB safety zone is not visible and more than 2 power-downs due to marine mammal presence within the 180 dB safety zone have occurred within the past 12 hours.

## 9. Monitoring.

(a) *Seismic Vessel Monitoring:*

(i) The holder of this Authorization must have biologically-trained, marine mammal observers (MMOs) to be onboard the seismic source vessel and designated support vessels.

(ii) MMOs will monitor to:

(A) Ensure that no walruses and polar bears enter the appropriate safety zones established under condition 8(b)(iii), whenever the seismic array is on.

(B) Record marine mammal activity as described in condition 9(a)(v) below. At least two observers must be on watch during ramp ups and the 30 minutes prior to full



ramp ups, and for as large a fraction of the other operating hours as possible. At all other times, at least one observer must be on active watch whenever the seismic airgun array is operating during all daytime airgun operations, during any nighttime power-ups of the airguns and at night, whenever that day's monitoring resulted in one or more power-downs due to marine mammal presence.

(iii) The crew also must be instructed to keep watch for walruses and polar bears at all times. If any are sighted, the bridge watch-stander must immediately notify the MMO on-watch.

(iv) Observations by the MMOs on marine mammal presence and activity will begin a minimum of 30 minutes prior to the estimated time that the seismic source is to be turned on and/or ramped-up.

(v) For each walrus or polar bear sighting, MMOs will record the following:

(A) Species, group size, age/size/sex categories (if determinable), behavioral activity, heading (if consistent), bearing and distance from seismic vessel, sighting cue, behavioral pace, and apparent reaction of animals seen near the seismic vessel and/or its airgun array.

(B) Time, location, heading, speed, and activity of the vessel, along with sea state, ice cover, visibility, cloud cover and sun glare at: (1) any time a marine mammal is sighted, (2) at the start and end of each watch, and (3) during a watch (whenever there is a change in one or more variable)

(C) The identification of all vessels that are visible within 5 km of the seismic vessel whenever a marine mammal is sighted, and the time observed, bearing, distance, heading, speed and activity of the other vessel(s).

(vi) All MMOs must be provided with and use appropriate night-vision devices, Big Eyes, and reticulated and/or laser range finding binoculars.

(vii) The operator of the seismic vessel must maintain a log of seismic activity noting the date and time of all changes in seismic activity (e.g., ramp up, power down, shut down, changes in the number of active airguns or the volume of airgun arrays) and any corresponding changes in monitoring radii.

(b) *Chase Boat Monitoring:*

(i) At least one "chase boat" will assist in monitoring safety and monitoring zones during active seismic survey operations. The chase boat will have at least two MMOs onboard to collect marine mammal observations.

(ii) The MMOs on the chase boat will immediately contact the seismic survey ship if walruses and polar bears are sighted within the 180/190-dB safety zone.

## 10. Reporting:

(a) *Marine mammal observer training manual and data collection protocols.* Prior to the initiation of seismic operations, the operator must provide the Service with:

(i) A description and documentation of the MMO training program;

(ii) a copy of the MMO field manual and/or operating procedures; and,

(iii) a key to MMO data codes, including definitions and descriptions of all data fields.

(b) *Sound source verification report.* The results of field source verification and the distances to the various sound radii are to be reported to the Service within 5 days of

completing the measurements.

(c) *Weekly summary of walrus and polar bear sightings.* The operator must tabulate and report all walrus and polar bear sightings recorded by the MMOs to the Service on a weekly basis. For each walrus or polar bear sighting include:

- (i) a unique sighting identification number;
- (ii) species, group size, age/size/sex categories, and substrate (on ice, in water, both);
- (iii) date, time and location (for pre-lease seismic surveys, specific location information may be withheld until the results of the next lease sale are announced);
- (iv) environmental conditions including: water depth (meters), sea state (Beaufort scale), visibility 1 (#km), visibility 2 (light/dark), visibility 3 (glare: none, little, moderate, severe), ice condition 1 (estimated % ice cover in vicinity of sighting), ice condition 2 (estimated distance (km) to pack ice);
- (v) estimated range (meters) at first sighting, estimated range (meters) at closest approach;
- (vi) the behavior of animals sighted (if determinable);
- (vii) Whether animals appeared to react to the presence of the ship (yes, no), if yes, describe the reaction of the animal(s);
- (viii) vessel activity at time of sighting including: vessel name; vessel speed (knots); seismic activity code; action taken by operator in response to sighting? (yes, no) If yes, specify (e.g. power-down, shutdown); and,
- (ix) any MMO comments or notes

(d) *Notification of incident report.* The operator must report:

(A) any incidental lethal take or injury of a polar bear or walrus; and,

(B) observations of walruses or polar bears within the prescribed safety zones (180/190 dB radii around seismic arrays, or 0.5 mile marine/aircraft buffer areas) to the Service within 24 hours. Reports should include all information specified under 10(c) as well as a full written description of the encounter and any actions taken by the operator.

(e) *Post season seismic monitoring report:* A draft report will be submitted to the Service within 90 days after the end of the seismic survey program in the Chukchi Sea. The report will describe in detail:

- (i) the operations that were conducted;
- (ii) the results of the acoustical measurements to verify the safety radii;
- (iii) the methods, results, and interpretation pertaining to all monitoring tasks;
- (iv) the results of the 2007 shipboard marine mammal monitoring;
- (v) a summary of the dates and locations of seismic operations, including summaries of power downs, shut downs, and ramp up delays;
- (vi) marine mammal sightings (species, numbers, dates, times and locations; age/size/gender, environmental correlates, activities, associated seismic survey activities);
- (vii) estimates of the amount and nature of potential take (exposure) of walruses and polar bears (by species) by harassment or in other ways to industry sounds;
- (viii) an analysis of the effects of seismic operations (e.g., on sighting rates, sighting distances, behaviors, movement patterns of walruses and polar bears);
- (ix) provide an analysis of factors influencing detectability of walruses and polar bears;

and,

(x) provide summaries on communications with hunters and potential effects on subsistence uses


The draft report will be subject to review and comment by the Service. Any recommendations made by the Service must be addressed in the final report prior to acceptance by the Service. The draft report will be considered the final report for this activity under this Authorization if the Service has not provided comments and recommendations within 90 days of receipt of the draft report.

(f) *Seismic monitoring data*: An electronic copy of all seismic monitoring data described in condition 9(a)(v) and (vii) will be submitted to the Service within 90 days after the end of the seismic survey program.

11. Activities related to the monitoring described in this Authorization do not require a separate scientific research permit issued under section 104 of the Marine Mammal Protection Act.

12. A copy of this Authorization, the Service-approved Marine Mammal Monitoring and Mitigation Plan, and the Service-approved Polar Bear Interaction Plan must be in the possession of the operator of all vessels and aircraft engaging in the activity operating under the authority of this Letter of Authorization.

13. Per the "Programmatic Biological Opinion for the Beaufort Sea Incidental Take Regulations for Polar Bear (June 2008)", your request also triggers the second of the two-tiered programmatic process. In order for incidental take of the polar bear to be exempted from the prohibitions of the ESA, the LOA also serves as an "Incidental Take Statement" (ITS), required under section 7 of the Endangered Species Act of 1973 (ESA). Issuance of the LOA/ITS fulfills the requirements for Tier 2 Consultation of the Programmatic Biological Opinion for the activities described in this letter.

  
Acting Regional Director

10 July 08  
Date

The first part of the paper discusses the importance of the study and the objectives of the research. It also provides a brief overview of the methodology used in the study. The second part of the paper presents the results of the study and discusses the implications of the findings. The third part of the paper concludes the study and provides some final thoughts on the research.

The study was conducted using a combination of qualitative and quantitative methods. The qualitative methods included interviews with experts in the field and a review of the literature. The quantitative methods included a survey of a large number of participants. The results of the study show that there is a significant relationship between the variables studied.

The findings of the study have several implications for practice and policy. First, the study suggests that there is a need for further research in this area. Second, the study suggests that there are some practical steps that can be taken to improve the situation. Finally, the study suggests that there are some policy implications that need to be considered.

In conclusion, the study has shown that there is a significant relationship between the variables studied. The findings have several implications for practice and policy. Further research is needed in this area, and there are some practical steps that can be taken to improve the situation. Finally, there are some policy implications that need to be considered.



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## United States Department of the Interior

### FISH AND WILDLIFE SERVICE

1011 E. Tudor Road  
Anchorage, Alaska 99503-6199



AFES/MMM

### U.S. Fish and Wildlife Service

## AUTHORIZATION TO TAKE, BY HARASSMENT, POLAR BEARS

ISSUED: July 7, 2008

EXPIRES: November 30, 2008

Under Sections 101 (a)(4)(A), 109(h), and 112(c) of the Marine Mammal Protection Act of 1972, as amended, Shell Offshore, Inc. (Shell) is authorized to take, by harassment, polar bears during exploration activities in association with the 2008 Beaufort Sea Open-water Exploration Program. Shell, in partnership with geophysical contractors, will be conducting site clearance, shallow hazard surveys, and a 3D seismic program in the Beaufort Sea. A detailed description of the authorized activities can be found in the, "Request for Letter(s) of Authorization for the Incidental Take of Polar Bears and Pacific Walrus and intentional Take of Polar bears for Various Open Water Activities in the Beaufort Sea, 2008," dated November 30, 2007.

The purpose of authorizing taking by harassment, or deterrence, is to maintain human and bear safety and welfare in the North Slope oilfields. Authorizing Level B harassment take reduces the likelihood of death or injury of polar bears. This is accomplished by the following objectives:

1. Prevent bears from associating food with humans and facilities;
2. "Train" bears to avoid people;
3. Allow bears to use travel routes (natural and man-made) to move along the coast;
4. Prevent bears from extended use of areas around facilities;
5. Prevent bears from entering the developed parts of the oilfield

Harassment authorization is subject to the following conditions:

1. The "Polar Bear and Pacific Walrus Awareness and Interaction Plan, North Slope and Chukchi Sea, Alaska, April 2008," is approved and all provisions must be complied with unless specifically noted otherwise in this Letter of Authorization. A copy of this polar bear interaction plan must be available on site for all personnel.

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2. Shell Operations Managers, or their designates, must be fully aware of, understand, and be capable of implementing the conditions of this authorization.
3. This authorization is restricted to harassment activities.
4. Authorized individuals are responsible for documenting and reporting to the U.S. Fish and Wildlife Service, Marine Mammals Management Office, (907) 786-3800, all instances involving harassment activities as soon as possible and not later than 24 hours after the occurrence.
5. Activities will not operate nor pass within 1 mile of known polar bear dens, and all observed dens will be reported to the Marine Mammals Management Office, Fish and Wildlife Service immediately. Should occupied dens be identified within one mile of activities, work in the immediate area will cease and Service will be contacted for guidance. The Service will evaluate these instances on a case-by-case basis to determine the appropriate action. Potential responses may range from cessation or modification of work to conducting additional monitoring.
6. A final report of all encounters and hazing events must be submitted to the U.S. Fish and Wildlife Service, Marine Mammals Management Office within 60 days from the expiration date of this authorization.
7. Hazing techniques must not cause the injury or death of a bear. Types of hazing techniques may include, but are not limited to:
  - Bear Monitors;
  - Air horns;
  - Electric fences;
  - Chemical repellents;
  - Acoustic recordings;
  - Vehicles;
  - Projectiles: cracker shells, bean bags, rubber bullets, screamers, etc.
8. Prior to conducting a harassment activity, operators must:
  - Reduce/eliminate attractants;
  - Secure site; notify supervisor; move personnel to safety;
  - Ensure bear has escape route(s);
  - Ensure communication with all personnel
9. When conducting a harassment activity, operators must:



- Choose the method that will have the least effect on the bear and increase the intensity of the method or use additional methods only if necessary;
- Shout at the bear before using projectile (avoidance conditioning);
- Move bear in proper direction; continue with minimal necessary deterrents to receive desired result

10. After a harassment event has occurred, operators must:

- Monitor bear movement (to ensure no return);
- Notify supervisor and personnel to resume work;
- Fill out report to be sent to the Service as required under condition 4 (within 24 hours)

11. This Authorization is valid for the period indicated on this authorization, unless extended or terminated in writing by the U.S. Fish and Wildlife Service, Marine Mammals Management Office.

Signed: \_\_\_\_\_

*Jay Edwards*

Date: \_\_\_\_\_

*10 July 08*

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the structure of the atom is determined by the laws of quantum mechanics.

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